Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) An isolated complex comprising:

a heme binding protein complexed with a porphyrin, wherein said complex reversibly binds oxygen with a low affinity and wherein said protein comprises the amino acid sequence of SEQ ID NO:2 ~~comprises~~

~~(i) a heme binding domain that has at least 20% identity to SEQ ID NO: 76, comprises proline at a position corresponding to residue 37 of SEQ ID NO: 76, phenylalanine at a position corresponding to residue 43 of SEQ ID NO: 76, and histidine at a position corresponding to residue 93 of SEQ ID NO: 76, and associates with the porphyrin; and~~

~~(ii) an aerotaxis signaling domain that has at least 30% identity to SEQ ID NO: 79.~~

2-10 (canceled)

11. (currently amended) A blood substitute comprising [[a]] the complex according to claim 1.

12-47 (canceled)

48. (currently amended) A chimeric protein comprising:

a heme-binding domain of ~~an isolated heme binding bacterial~~ a protein comprising the amino acid sequence of SEQ ID NO: 2, ~~wherein the heme binding domain has at least 20% identity to SEQ ID NO: 76, and comprises proline at a position corresponding to residue 37 of SEQ ID NO: 76, phenylalanine at a position corresponding to residue 43 of SEQ ID NO: 76, and histidine a position corresponding to residue 93 of SEQ ID NO: 76;~~ and

a heterologous signaling domain.

49. (previously presented) The chimeric protein according to claim 48, wherein the heterologous signaling domain is a mutated signaling domain having altered affinity for its ligand.

50-53 (canceled)

54. (previously presented) The chimeric protein according to claim 52, wherein the heme binding domain comprises the amino acid sequence of SEQ ID NO: 77.

55-65 (canceled)

66. (previously presented) The complex according to claim 1 wherein the complex is purified.

67. (previously presented) The complex according to claim 1 wherein the complex is recombinant.

68-73 (canceled)

74. (previously presented) The complex according to claim 1, wherein the porphyrin is a Fe-porphyrin.

75. (previously presented) The complex according to claim 74, wherein the Fe-porphyrin is a heme molecule.

76. (previously presented) The complex according to claim 75, wherein the heme molecule is a b-type heme molecule.

77. (previously presented) The complex according to claim 75, wherein the complex has an oxygenated form characterized as having spectral properties of: Soret band absorption at 406 nm, α-band absorption at 578 nm, and β-band absorption at 538 nm.

78. (previously presented) The complex according to claim 75, wherein the complex has a deoxygenated form characterized as having spectral properties of: Soret band absorption at 425 nm, and converged α-band and β- band absorption centered at 555 nm.

79. (previously presented) The complex according to claim 1, wherein the porphyrin is a Zn-porphyrin.

80. (previously presented) The complex according to claim 1, wherein the porphyrin is a Sn-porphyrin.

81. (previously presented) The blood substitute according to claim 11, wherein the porphyrin is a Fe-porphyrin.

82. (previously presented) The blood substitute according to claim 81, wherein the Fe-porphyrin is a heme molecule.

83. (new) The complex according to claim 1, wherein the heme binding protein having the amino acid sequence of SEQ ID NO: 2 comprises a heme-binding domain that associates with the porphyrin and an aerotaxis signaling domain.